

US EPA ARCHIVE DOCUMENT



www.epa.gov

# Technical Assistance: Geophysical Characterization of Spears Well #2, Arbuckle-Simpson Aquifer

Randall Ross, Steve Acree

USEPA Office of Research and Development

National Risk Management Research Laboratory Ground Water and Ecosystems Restoration Division Ada Oklahoma USA

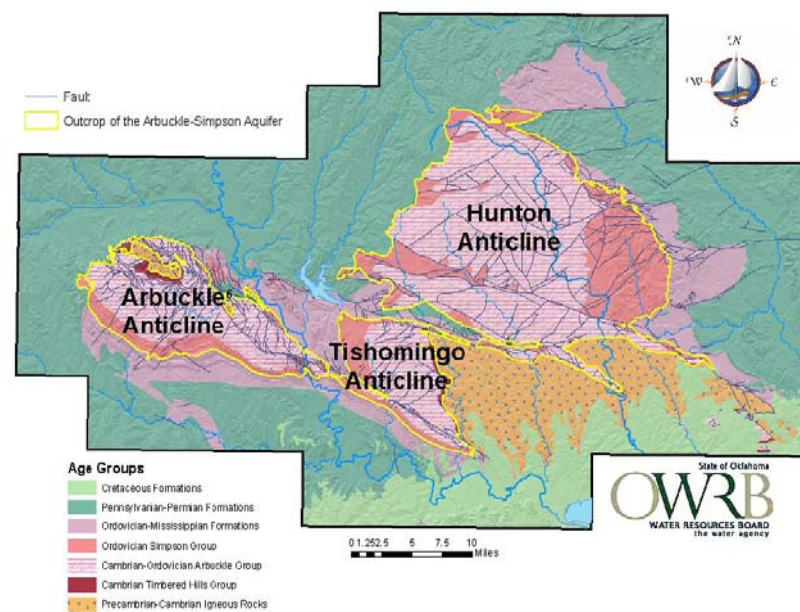
Randall Ross | [ross.randall@epa.gov](mailto:ross.randall@epa.gov) | 580-436-8611

## Objectives

- Conduct geophysical logging to characterize geology.
- Assist in refining conceptual site model (CSM) of Arbuckle-Simpson aquifer.
- Characterize ambient ground water flow conditions within aquifer.
- Collect ground water samples at specific intervals.

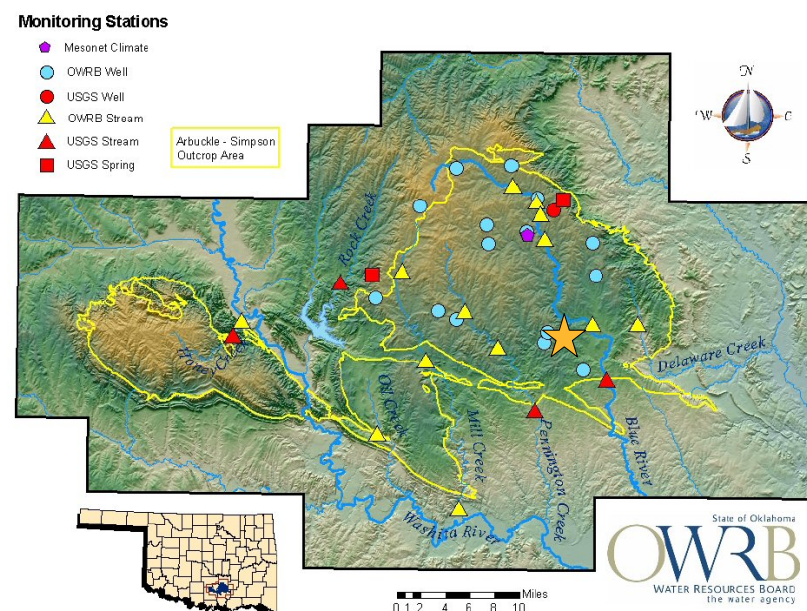
## Arbuckle-Simpson Aquifer Study

- Arbuckle-Simpson aquifer underlies approximately 500 square miles of south-central Oklahoma.
- Hunton Anticline covers approximately 360 square miles and is a sole source aquifer for numerous towns in Pontotoc, Johnston, Murray and Carter counties of OK.
- Over \$4 million has been appropriated by the State and Federal governments to determine how much water may be withdrawn from the aquifer without significantly impacting surface water.



## Elements of ASA Study

- The ASA study established numerous ground water and surface water monitoring locations.
- Two wells were drilled near the Blue River in an aquifer discharge zone (★).



## USGS Air Rotary Rig

- An air rotary rig operated by the USGS was used to drill through carbonate rocks.
- Drilling difficulties resulted in abandonment of the first hole at approximately 650 feet below land surface.
- Total depth of the deep hole was 1809 feet below land surface.



## Water Quality Sampling

- USGS sampled multiple depths.
- Water quality results were similar at all depths.



## RSKERC Geophysical Logging Tools

- E-Log (Resistivity, SP, Temperature, Natural  $\gamma$ )
- Induction
- EM Flowmeter
- Caliper
- Acoustic TelevIEWer
- Sonic
- Fluid Sampler



## Conclusions

- Numerous solution enlarged fractures and karst features were identified by geophysical logging.
- Minimal ambient flow in the upper  $\approx$  500 feet of borehole.
- A small fracture zone at  $\approx$  530 feet bls contributes  $> 40$  L/m flow down hole. (\*See log.)
- Water quality of samples obtained from depths below 530 feet bls will reflect the water quality from the producing fracture.

